

Application Serial Number: 09/528,296

REMARKS

Claims 1-4 and 7-12 are pending in this application. Claims 1-4 and 7 were examined on the merits in the last Office Action. Claims 8-12 remain withdrawn from consideration. With the present submission, claim 1 is amended.

Claims 1-4 and 7 stand rejected under 35 U.S.C. § 103(a) as obvious over the prior art depicted in the present application, labeled "Admitted Prior Art (APA)," in view of *Cook et al.* (U.S. Patent No. 6,022,791) and *Chiang et al.* (U.S. Patent No. 5,817,572). Applicant respectfully submits that the rejection should be withdrawn.

Base claim 1, as amended, describes a semiconductor device with a guard ring pattern that includes:

[a] conductive wall changing a direction thereof repeatedly and alternately in one of a triangular wave pattern and a rectangular wave pattern.

Claims 2-4 and 7 depend from claim 1, so they include this feature by virtue of their dependency. The applied prior art does not suggest such a semiconductor device.

The Office Action indicates that the rejection relies on the *APA* guard ring structure 12 to teach a guard ring pattern, but the Office Action also acknowledges that this structure does not change direction repeatedly and alternately. Accordingly, to justify the obviousness rejection relying on *APA* as the primary reference, the Office Action must provide a suggestion to modify the guard ring structure 12 to change direction repeatedly and alternately. Applicant respectfully submits that the Office Action does *not* provide an adequate motivation for such a modification.

As motivation to modify the *APA* guard ring structure 12 to change direction repeatedly and alternately as claimed, the Office Action cites *Cook et al.*, in particular, conductor patterns 60 and 70 and col. 4, lines 14-24. However, this disclosure does not provide the required motivation to justify an obviousness rejection.

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Applicant directs attention to the *APA* discussion on p. 1, lines 26-34, which indicates that a guard ring structure is generally used to block moisture or corrosive gas penetration into the interior of a semiconductor device. The *APA* then discusses, beginning on p. 5 at line 11, the chemical mechanical polishing (CMP) process used as a related manufacturing step. Further, the *APA* discusses, e.g., beginning at p. 7, line 11, the problem of exfoliation that occurs as a result of the CMP process. The *APA* does *not* teach that this problem can be overcome by modifying the guard ring structure 12 so that it changes direction repeatedly and alternately as claimed.

As noted, the rejection relies on the *Cook et al.* conductor patterns 60 and 70 and on the discussion in col. 4, lines 14-24, as motivation to modify the *APA* guard ring structure. Applicant acknowledges the serpentine paths of the *Cook et al.* conductor patterns 60 and 70. However, the Office Action provides no proper motivation to implement such serpentine paths into the *APA* design. Instead, the Office Action cites col. 4, lines 14-24, of *Cook et al.*, which states:

... the present inventors found that they could provide a crack stop that was nearly as efficient as a traditional air fill-type crack stop without adding any additional masking or etching steps simply by providing a crack stop ring in a geometric pattern, such as serpentine ring 60. ...

That is, the disclosure relied upon to suggest modifying the *APA* guard ring structure 12 does not address the disclosed problem of exfoliation that occurs as a result of the CMP process. Instead, the cited *Cook et al.* teaching discusses a solution to the different problem of crack propagation during a dicing process (see, e.g., the discussion beginning in col. 1 at line 4), and the Office Action does not explain how this was supposedly a problem using the *APA* technology. Because the Office Action does not mention a problem that the cited *Cook et al.* disclosure addresses, the

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Office Action has not explained why one skilled in the art would supposedly apply the cited *Cook et al.* "solution" to modify the *APA* guard ring pattern.¹

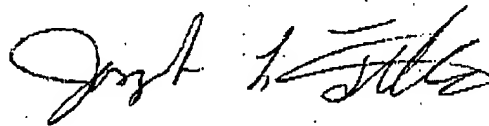
For this reason, applicant respectfully submits that the Office Action has not properly justified the obviousness rejection. Accordingly, withdrawal of the obviousness rejection is now solicited.

In view of the remarks above, applicant now submits that the application is in condition for allowance. Accordingly, a Notice of Allowability is hereby requested. If for any reason it is felt that this application is not now in condition for allowance, the Examiner is invited to contact applicant's undersigned attorney at the telephone number indicated below to arrange for disposition of this case.

In the event that this paper is not timely filed, applicant petitions for an appropriate extension of time. The fees for such an extension, or any other fees which may be due, may be charged to Deposit Account No. 50-2866.

Respectfully submitted,

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¹ Applicant's discussion here highlights only one of the differences between the *APA* and *Cook et al.* technologies. Further study of the reference uncovers additional differences.

For example, the *Cook et al.* discussion beginning in col. 3 at line 48 explains the desirability of using an air fill type crack stop. Such would not be desirable in the *APA* semiconductor device, because, as explained above, the guard ring structure is used to block moisture, and the addition of air into the guard ring structure would not be consistent with this goal. Note the added text to claim 1 to emphasize this distinction.

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